IPRL Offshoots



USDA-ARS Invasive Plant Research Laboratory 3205 College Ave., Fort Lauderdale, Fl 33314

June/July 2004



Upcoming Events

44th Annual Meeting of the Aquatic Plant Management Society July 11-14, 2004 Tampa, Florida www.apms.org

Florida Entomological Society
Annual meeting
July 25 – 28, 2004
Radisson Bahia Mar Beach Resort
801 Seabreeze Blvd.,
Fort Lauderdale, FL 33316
http://www.flaentsoc.org/
annual.htm

89th Annual Meeting of the Ecological Society of America August 1-6, 2004 Portland, Oregon www.esa.org/portland/

More upcoming events on page 9

South Florida is not the only location outside of Australia that is having problems with melaleuca invasions. In the

United States, melaleuca has taken root in Lousiana, Texas, California, Hawaii, and Puerto Rico (the subject of this report). Elsewhere, it occurs as an exotic in Costa Rica and Japan, as well as many islands in the Pacific and might be hiding in other places.

One of the tasks of the TAME Melaleuca project is to identify locations where melaleuca is located, determine the extent of its presence and transfer the information to other countries to aid in their struggles to control this species. Dr. Paul Pratt,

director of the TAME Melaleuca project, has taken several trips to Puerto Rico to assist the scientists there with assessing their melaleuca situation.

John Scoles - Editor

Melaleuca Invades Puerto Rican Wetlands

Melaleuca (*Melaleuca quinquenervia*) has been globally dispersed over the course of the last century for use as an ornamental plant, to re-vegetate cleared areas, and for forestation. It was introduced in the continental United States to California, Texas, and Louisiana, but it was most widely planted in Florida. While not known to be invasive elsewhere, melaleuca has proven to be a superior competitor to native vegetation occurring in wetlands of the Florida Everglades. After its introduction, melaleuca spread at an estimated rate of over 7,000 acres per year and the weed now dominates over 494,000 acres of Everglades ecosystems. These melaleuca wetland forests typically form dense monocultures characterized by continuous upper canopies with sparse understories.

Melaleuca has also been planted widely as an ornamental on the Caribbean island of Puerto Rico.

When considering this tree's invasive nature in Florida, the abundance of wetland habitats, and its extensive use as an ornamental, it should not be surprising that the tree is also invading natural areas of Puerto Rico. Recent research done by Dr. Paul Pratt of the IPRL, in collaboration with scientists from the Puerto Rico Department of Natural Resources, addresses the extent of the melaleuca naturalization in Puerto Rico and possible methods of averting a landscape level invasion on the island.

Earliest known records concerning the planting of melaleuca in Puerto Rico date back to the first quarter of the twentieth century under the botanical synonym *Melaleuca leucadendron*. Further study uncovered reports and collection records documenting ornamental plantings of melaleuca within San Juan from the 1930s through the 1950s. In 1960, the Agricultural Extension Service of the University of Puerto Rico included melaleuca in a list of appropriate ornamental trees for small tracts of land and the tree was identified as highly tolerant to wet soils, dry periods, strong winds and some degree of salt intrusion. Demand for the tree in urban landscaping increased substantially island-wide throughout the 1980 and 90s, resulting in plantings of the tree in public parks

along certain highway medians and green areas.

Naturalized melaleuca populations were discovered at five locations on the island, primarily in the northern regions, of which three were investigated for this report. Like most areas of the Caribbean, the climate in this region is humid and warm.



Two naturalized stands of melaleuca have invaded the Tortuguero Lagoon Basin wetlands, with additional scattered single trees dispersed in the vicinity of the primary stands. The first stand has invaded areas in the southern portions of the Vincente Quevedo, Paul Pratt, and Eileen Ortiz, at the Tortuguero site 1

Photo by Lourdes Bernier

Puerto Rico Quick Facts:

Location:

Caribbean, island between the Caribbean Sea and the North Atlantic Ocean, east of the Dominican Republic

Geographic coordinates:

18° 15' North 66° 30' West

Map references:

Central America and the Caribbean

Puerto Rico Quick Facts:

Area:

total: 3,515 square miles water: 56 square miles land: 3,459 square miles

Area - comparative:

slightly less than three times the size of Rhode Island

Land boundaries:

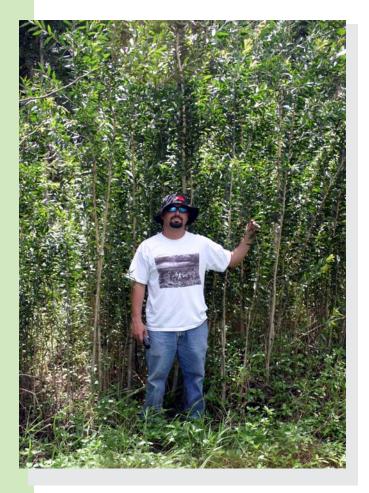
None

Coastline: 311 miles

Tortuguero Lagoon Natural Reserve and the second occurs near the north eastern boundary of the reserve, south of the town of Vega Baja. In the past, this wetland was partially drained, a series of irrigation canals were dredged, and the organically rich soils were farmed. Although the abandoned irrigation canals remain, restoration efforts have returned the area to a permanently flooded wetland.

The first melaleuca stand, consisting of about 20 trees, was originally discovered in 1995 by Vicente Quevedo of the Puerto Rican Department of Natural Resources. Shortly after the discovery, land managers cut down the trees near the soil level. The outcome of the cutting was stump regrowth and limited sprouting of seedlings.

The second, larger melaleuca population has invaded over 3 acres of the sawgrass dominated wetlands. The stand is predominantly widely dispersed mature trees. While the site was dominated by melaleuca, other tree species also occurred within the stand, including Australian pine and native ficus trees.



The third melaleuca population has invaded the San Juan Bay Estuary wetland, near the city of Carolina. This wetland drains into the Suarez Canal, which forms part of the San Juan Bay Estuary watershed. The site was once farmed, as indicated by existing canals, and is currently characterized by organic soils and a short wet period (flooded less than three months per year). Melaleuca was the dominant tree.

Strategies for controlling invasive weeds often include early detection of newly forming populations, timely use of appropriate control measures and continued monitoring after treatment. As described above, the time since establishment and the extent of melaleuca invasion is limited in Puerto Rico. In addition, multiple control tactics are available to combat the invasive

tree, with varying levels of efficacy and appropriateness.

Jamie Pabon poses with dense melaleuca saplings at Suarez Canal.

Photo by Dr. Paul Pratt

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Melaleuca is a fire-adapted species and therefore prescribed burns are not appropriate as multiple recent wildfires have had little apparent impact on the melaleuca population at Tortuguero Lagoon basin sites and are likely aiding the prolific sprouting of seeds at the San Juan Bay Estuary site.

Flooding has not proven an effective tool for suppressing existing melaleuca trees. Mature and sapling trees have the ability to withstand prolonged flooding. However, maintaining or increasing high water levels might play an important role in limiting seed sprouting. While maintaining extremely long periods of high water might reduce the numbers of seeds germinating, this change in natural areas might also adversely affect native plants and animals.

The most effective approach for managing melaleuca, which produces the most rapid results, is the use of herbicides. Two commonly used approaches for removing large individual trees involve girdling the trunks and applying an herbicide into the injury, and felling trees and treating the stumps. Herbicide is applied directly onto the exposed cambial layer of girdled trees, resulting in mortality of the above and below ground portions of the tree. Stumps of fallen melaleuca trees quickly regrow if left

untreated and cut stems must be suspended above the water level to avoid developing unintended roots.

Felling trees and manual removal of seedlings and small saplings are the only forms of mechanical control that are currently recommended for use in natural areas of South Florida.

Although time consuming, hand removal of saplings can be an effective method of controlling seedlings



and saplings of less than three feet in height.

Mechanically removing melaleuca using heavy
equipment often results in unacceptable levels of
collateral damage to native vegetation and soil systems.
However, heavy equipment works well in accessible

Hack and squirt treatment used on melaleuca

Photo by Paul Pratt

Puerto Rico Quick Facts:

Maritime claims: exclusive economic zone: 200 nautical

miles

territorial sea: 12 nautical miles

Climate:

tropical marine, mild; little seasonal temperature variation

Terrain:

mostly mountains, with coastal plain belt in north; mountains precipitous to sea on west coast; sandy beaches along most coastal areas

Puerto Rico Quick Facts:

Elevation extremes:

lowest point: Caribbean Sea 0 feet highest point: Cerro de Punta 4,390 feet

Natural resources:

some copper and nickel; potential for onshore and offshore

Land use:

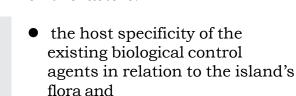
arable land: 3.72% permanent crops: 5.07% other: 91.21% (1998 est.)

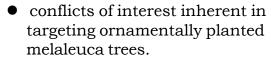
areas, such as along canals, utility rights-of-way, and in new developments.

Classical weed biological control involves reuniting an invasive plant with certain natural enemies from its native range. The introduction of two specialized insects has been demonstrated as an effective method of controlling melaleuca in Florida. The first candidate selected was the melaleuca weevil Oxyops vitiosa. The second insect introduced was the melaleuca psyllid, Boreioglycaspis melaleucae. It was released in South Florida in 2002. Psyllid adults and nymphs both feed on expanding buds and leaves but as competition for these sites increase, nymphs also exploit mature, fully expanded leaves. Preliminary data have shown that feeding by psyllids results in a 60% mortality of seedlings within three generations of the insect (less than six months.)

The feasibility of using a biological control program for melaleuca in

Puerto Rico is dependent, in part, on two factors:





The biological control agents other native Myrtaceae and closely

approved for introduction into Florida have not been evaluated as to their tendency to attack Myrtaceae of Puerto Rico and the Virgin Islands. These species, as well as representatives from the related economically important flora, must be evaluated prior to requesting permission to introduce the insects into Puerto Rico.

After release, biological control agents attack ornamental

plantings and invasive weed populations alike. While controlling ornamental trees will limit further invasion of environmentally sensitive wetlands, the public might object to the damage caused to their trees. Therefore,



Mature melaleuca at the Tortuguero site 2.

Photo by Paul Pratt

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conflicts of interest between the issues of halting further invasion of wetlands and maintaining ornamental plantings must be addressed prior to using a biological control program for melaleuca in Puerto Rico.

In Florida, it was determined that an integration of all available control techniques is required to effectively remove melaleuca from natural areas. The overall philosophy of integrated control methods is to suppress invasive weeds through a combination of biological, physical, and chemical methods that reduce pest populations to acceptable levels while minimizing impacts on the environment. This strategy, however, was developed while realizing that melaleuca was widely distributed over vast natural areas that were difficult to access making eradication unfeasible. In contrast, the geographic distribution of melaleuca in Puerto Rico is limited, so cost-effective herbicides can halt existing invasions.

When considering its broad use as an ornamental plant, it is doubtful that naturalization and invasion of melaleuca is limited to Puerto Rico and Florida. Ornamental plantings also occur on St. John in the Virgin Islands; the Dominican Republic; San José, Costa Rica; and in anecdotal reports from the Zapata Peninsula in Cuba as well as Cuernavaca, Mexico. It remains unclear, however, if melaleuca is spreading beyond these intentional plantings into nearby environmentally sensitive lands of the West Indies and Central America.

Puerto Rico Quick Facts:

Irrigated land: 154 square miles (1998 est.)

Natural hazards: periodic droughts; hurricanes

Environment current issues: erosion; occasional drought causing water shortages

Lourdes Bernier at Canal Suarez.

Photo by Paul Pratt.

Puerto Rico Quick Facts:

Geography - note: important location along the Mona Passage - a key shipping lane to the Panama Canal: San Juan is one of the biggest and best natural harbors in the Caribbean; many small rivers and high central mountains ensure land is well watered; south coast relatively dry; fertile coastal plain belt in north

Agricultural products:

sugarcane, coffee, pineapples, plantains, bananas; livestock products, chickens

Quick Facts were taken from the CIA World Factbook, January, 2004.

IPRL Loses Three and Gains Two

During June and July the IPRL said goodbye to three fine staffers. Two Student Conservation Association (SCA) interns, Melissa Martin and Lisa Brutcher have gone off to graduate school. One Student Temporary Employment Program (STEP) intern, Jennifer Palacio, left in June to pursue other interests.

Melissa Martin spent two years at the lab working on salvinia and melaleuca projects with Dr. Phil Tipping. She has a bachelor of science degree in Environmental Science from the University of Notre Dame and is leaving us to attend graduate school at the University of Florida where she will pursue a masters degree from the school of soil and water conservation.

Lisa Brutcher is off to Oregon State University to pursue a Ph.D. in Crop and Soil Science. She spent a year and five months at the IPRL working for Paul Madeira on soil microbial density studies. Lisa received her bachelor of science degree in Plant Biology and Urban Horticulture from the University of Arizona.

Jennifer Palacio worked at the IPRL as a technician for about a year and has now gone to train as an Emergency Medical Technician (EMT.) While she was here she worked for Dr. Ted Center.

Everyone at the lab wishes them a fond farewell. Good Luck, Melissa, Lisa and Jennifer!

Two new SCA interns joined the staff in July. Ryan Pierce graduated from Clemson University with a bachelor of science degree in Biology and now wishes to put all his knowledge to work. He has replaced Melissa Martin, working with Dr. Phil Tipping. Ryan plans a one-year stint at the IPRL.

Ian Thomas also joined the staff in July. Ian graduated from Rollins College with a bachelor of arts degree in Biology and will work for Dr. Ted Center. He will be with the IPRL of one year.

Welcome, Ryan and Ian!

Web Sites You May Want to Visit

To learn more about invasive plants and what various organizations are doing about them, visit the following sites on the internet.

Agricultural Research Service www.ars.usda.gov/

Center for Exotic and Invasive Plants plants.ifas.ufl.edu

Federal Noxious Weed Program www.aphis.usda.gov/ppq/weeds

Florida Department of Agriculture, Department of Plant Industry www.doacs.state.fl.us/~pi/index.html

Florida Department of Environmental Protection, Bureau of Invasive Plant Management www.dep.state.fl.us/lands/invaspec/

Florida Exotic Pest Plant Council www.fleppc.org

Invasive Plant Research Laboratory www.weedbiocontrol.org/

The National Agricultural Library's Invasive Species website

www.invasivespecies.gov

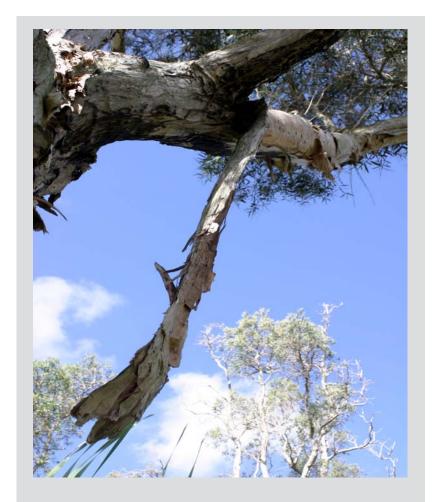
National Noxious Weed Program http://dogwood.itc.nrcs.usda.gov/weeds

South Florida Water Management District www.sfwmd.gov

Southwest Florida Water Management District www.swfwmd.state.fl.us/

TAME Melaleuca Project http://tame.ifas.ufl.edu

The Nature Conservancy http://nature.org/



Picture of the Month

A good example of why melaleuca is called the "paper-bark" tree. The photo was taken at the Tortuguero Lagoon Basin in Puerto Rico.

Photo by Paul Pratt



Here is another example. This shot was taken in South Florida.

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More upcoming events

8th Conference of the International Society for Plant Anaerobiosis (ISPA).
September 20-24, 2004
School of Plant Biology, University of Western Australia
Perth, Western Australia
http://www.ibba.cnr.it/ispa/8th_conference/index.html

28TH Annual Florida Aquatic Plant Management Society Training Conference Oct 17-20, 2004 Deerfield Beach, FL 33441 www.homestead.com/fapms/ meeting.html

31st Annual Natural Areas Conference October 13-16, 2004 Holiday Inn Mart Plaza Chicago, II

24th International Symposium of the North American Lake Management Society November 3-5, 2004 Victoria Conference Centre Victoria, British Columbia http://www.nalms.org/symposia/ symposia.htm

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Previous reports are available online at: http://tame.ifas.ufl.edu/html/publications.htm

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